

Neurorehabilitation after stroke:
*What does the evidence say and
Why don't we just do it?*

Outline

What does the evidence say?

- Task specific practice
- At Intensity
- What else do we have evidence for?
 - Motor imagery, mirror therapy
 - Strengthening interventions



Outline

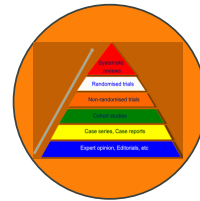
Why don't we just do it??!!!

The barriers -

1. Personal
2. Environmental
3. Cultural



What does the evidence say?



Clinical practice guidelines

For stroke survivors who have difficulty sitting,

- practising **reaching beyond arm's length while sitting** with supervision/assistance

For stroke survivors who have difficulty with standing,

- activities that challenge balance, functional tasks or weight-shifting **in standing**

Stroke survivors with difficulty walking,

- **tailored repetitive practice of walking** or **components of walking**
- as much as possible



<https://app.magicapp.org/#/guideline/Kj2R8j/section/j7QAvn>

Clinical practice guidelines

For stroke survivors with some active wrist and finger extension,

- **intensive constraint-induced movement therapy**
- minimum 2 hours of active therapy per day for 2 weeks
 - plus restraint for at least 6 hours a day

For stroke survivors with at least some voluntary movement of the arm and hand,

- **repetitive task-specific training** may be used to improve arm and hand function



<https://app.magicapp.org/#/guideline/Kj2R8j/section/j7QAvn>

Clinical practice guidelines

- People with some upper limb movement at any time after stroke,
- repetitive task practice as the principal rehabilitation approach
 - in preference to other therapy approaches including Bobath.
- People with impaired mobility after stroke,
- repetitive task practice as the principal rehabilitation approach
 - in preference to other therapy approaches including Bobath



Task specific practice

What is it?

Cochrane review of repetitive task training

- Active motor sequence performed repetitively
- Aimed towards a clear functional goal
- Pre-task movements, complex, multi-joint



Effective task training



Addresses the biomechanical requirements of the task



Adapted to the stroke survivor's impairments

Michael



Michael

Kinematic deviation

Decreased hip flexion throughout swing

Decreased ankle dorsiflexion throughout swing

Decreased/ increased hip adduction in early stance

Decreased hip extension mid to late stance

Decreased ankle plantarflexion late stance



Michael

Kinematic deviation

Decreased hip flexion throughout swing

Decreased ankle dorsiflexion throughout swing

Decreased/ increased hip adduction in early stance

Decreased hip extension mid to late stance

Decreased ankle plantarflexion late stance



Biomechanical requirements

Stroke
ed

10 reps
Left = 9 secs
Right = 12 secs



Biomechanical requirements

Stroke
ed



Michael

Stroke
ed

Kinematic deviation

Decreased hip flexion throughout swing

Decreased ankle dorsiflexion throughout swing

Decreased hip adduction in early stance

Decreased hip extension mid to late stance

Decreased ankle plantarflexion late stance



Addressing impairments

Stroke
ed



Addressing impairments

Stroke
ed



Addressing impairments

Stroke
ed



Effective task training

Dependent on effective task analysis

Identification of –

- Kinematic deviations
- Contributing impairments

What else do we have evidence for?

Strengthening interventions – LL

- Electrical stimulation
- Repetitive practice
- Progressive resistance training

Strengthening interventions – UL

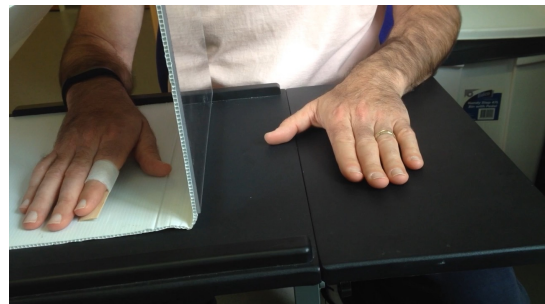
- Mirror therapy as an adjunct to routine therapy
- Mental practice in conjunction with active motor training
- Electrical stimulation in conjunction with motor training

<https://app.magicapp.org/#/guideline/Kj2R8j/section/I7QAvm>

Mental practice



Mirror therapy



Intensity - how much

A minimum of **three hours a day** of scheduled therapy is recommended, ensuring at least two hours of active task practice occurs during this time

How –

- Group circuit class therapy
- Self-directed, independent practice
- Semi-supervised and assisted practice involving family/friends, as appropriate

<https://app.magicapp.org/#/guideline/Kj2R8j/section/I7QAvm>

Intensity

People with motor recovery goals undergoing rehabilitation after a stroke should receive a minimum of **3 hours of multidisciplinary therapy** a day

How –

- Group work
- Self practice
- Open gyms
- Carer-assisted practice

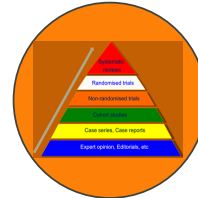
What should we do = Neuroplasticity

Principle

1. Use It or Lose It
2. Use It and Improve It
3. Specificity
4. Repetition Matters
5. Intensity Matters
6. Time Matters
7. Salience Matters
8. Age Matters
9. Transference
10. Interference

Kleim 2008

Why don't we just do it?



Why don't we just do it?

What are the barriers?

- Personal
- Environmental
- Cultural

Personal barriers

Personal barriers can include

- 1) So much research!!!
 - Unable to stay abreast of
 - > Large, complex body of research, constantly updated
 - Not confident reading/ appraising research
 - Does it apply to my patients?? i.e. people with complex impairments
- 2) Skills/ knowledge to implement the EBP
 - Knowing what to do and how to do it
- 3) Behaviour change
 - We continue with familiar/ easy - even when non evidence-based
 - Energy/ desire to change practice
 - > More thought/ effort in your work day if changing practice

Personal barriers

Strategies

- 1) So much research!!!
 - Use the guidelines
 - > Practical strategies
 - > EBP involves using your clinical expertise and adapting research evidence
 - Not ignoring it
 - > PD that helps with adapting the research to context
 - Reading/ appraising research
 - > Use the resources that help ie PEDro

Personal barriers

Strategies

- 2) Skills/ knowledge to implement the EBP
 - Changing your belief in your capabilities to implement an intervention
 - Professional development activities to increase skills
 - > Peer discussions/ clinical sessions
 - > Mentoring of less experienced staff
 - > Adapting the research to context

McCluskey 2013

Personal barriers



Amount of practice in one hour UL group

| Practice | Month 0 |
|------------------------|-----------|
| Practice time (min) | 17 (16) |
| Repetitions (n) | 53 (73) |
| Practice per class (%) | 32 (31) |
| Reps/min | 2.2 (2.6) |

Barrier identified

- lack of skills/ confidence in skills for UL retraining

Schneider 2019

Personal barriers



Intervention:

- 2-day workshop
- 3 one-hour meetings
 - developed an action plan
 - *staff education followed by staff meetings whereby staff themselves worked out how to integrate the training*
 - *i.e. staff were responsible for generating the solutions themselves*

Schneider 2019

Personal barriers



Amount of practice in one hour UL group

| Practice | Month 0 | Month 12 | Month 18 |
|------------------------|-----------|-----------|-----------|
| Practice time (min) | 17 (16) | 45 (13) | 40 (13) |
| Repetitions (n) | 53 (73) | 348 (335) | 250 (181) |
| Practice per class (%) | 32 (31) | 84 (23) | 85 (11) |
| Reps/min | 2.2 (2.6) | 7.2 (6.4) | 6.1 (3.5) |

Schneider 2019

Personal barriers



Education is not usually enough

Failed implementation of CIMT

- First Strategy was education
- Led to application of Behaviour change frameworks
- 1) Why didn't first attempt work?
 - Reflecting on failures
 - Understanding what went wrong
 - 2) Used Theoretical domains framework & Behaviour change wheel
 - Understand the barriers and enablers

Weerakkody 2023

Personal barriers



3) Develop behaviour change strategies

- By applying the frameworks

4) Develop CIMT program

- Adapted to the local context

5) Piloting the implementation

- Refined as required

Weerakkody 2023

Personal barriers



Strategies

3) Behaviour change

- Audit and feedback - personal accountability
- An evidence-based approach!!!
 - *small but potentially important improvements in professional practice*
- More effective when it:
 - Comes from a supervisor or colleague
 - Is provided more than once in verbal and written form
 - Includes
 - Explicit targets
 - Action plan

Ivers 2012

Personal barriers



Audit and feedback example

Non-compliance with stroke guidelines for sitting balance

- File audit showed 25% compliance
- Average reps of sit and reach
 - 5x per day, 140x per admission

Behaviour change

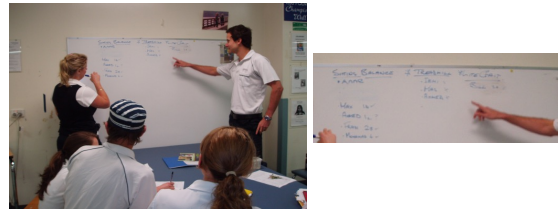
- Meetings
- Identifying barriers/ enablers
- Audit and feedback of practice - fortnightly

Personal barriers



Audit and feedback example

- 9 months later
- 100% compliance with stroke guidelines



Vratsistas-Curto 2017

Environmental barriers



Environmental barriers can include

1. Context of the research
 - Different countries/ rehab settings
2. Appropriate equipment/ space
 - Expensive equipment
 - Space for groups
3. Adequate staffing etc
 - Safety

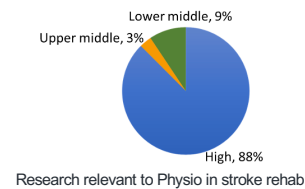
Environmental barriers



Strategies

- 1) Research comes from high income settings

Use the clinical practice guidelines produced in high income countries



Cultural barriers



Cultural barriers can include

- 1) Commitment of Management/ senior staff

- May support non evidence-based practices
- Time/ resources dedicated to the implementation of EBP

For example

- 242 hours to implement a first CIMT program
 - Acquiring knowledge/skills to deliver CIMT
 - Developing resources
 - Obtaining organisational support

McCluskey 2020

Cultural barriers



Cultural barriers can include

- 2) Accountability for staff/ services to use EBP

- No accountability
- No/ limited incentives to change practice

- 3) Role definition/ team work/ conflict in the workplace

- Lack of clarity in work roles
- Interpersonal conflict

McCluskey 2020

Cultural barriers



Strategies

- 1) Commitment from management
 - Identify champions
- 2) In an ideal world - accountability!!!
- 3) Role definition/ team work
 - Communication
 - Joint projects with distinct roles

Cultural barriers



Strategies

Role definition/ creating team work

- Communication
- Joint projects
- Defining roles

| UL Management Responsibilities | | |
|--------------------------------|--|--------------------------------------|
| ISSUE | PLAN | WHO |
| Muscle Length Maintenance | Shoulder- in supine abduction and external rotation 40 min daily Elbow - Wrist - 30 min daily one of the following: 1. Sitting, leaning through hand on floor 2. Over side of table with cup taped in hand 3. LFP hand (NB: elbow extended for all above stretches) | Physio OT |
| FES | EMAX shoulder - 2 x 6 hours daily to 50 and post debut Flex wrist extension- 60 min daily to wrist extension | Physio OT |
| Shoulder Support | For patients with MAX Item 6 - 3 for shoulder: 1. Sleep - even when standing/ walking or when arm cannot be supported 2. C-C wear during shower | Physio OT |
| Prevention of Trauma | Sticker "Mind my arm" for shoulder Sign above bed (general) | OT - Physio OT - Physio |
| Intensity of Practice | • Arm Group • CME • Upper Limb Station • Practice Sheets/ Diaries for Independent Practice | OT - Physio OT - Physio Physio |
| Measurement | • MAX Ppt • ER ROM • Passive wrist extension | Physio Physio OT |
| Record of Intervention | Record sheet kept in physio section of main file | OT and Physio |

Take home messages



- Large body of evidence for neuro rehab
 - Efficient ways to access that evidence
- Task specific training
 - Target impairments as required
- Barriers
 - Personal, environmental, cultural
- Dedicate time and use Change frameworks
 - Identify leaders
 - Adapt to local context
 - Regular audit and feedback

Every action you take is a vote for the person you wish to become

James Clear's bestseller *Atomic Habits*

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